Reminiscence Therapy Device Project Description

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***Abstract*—Dementia is a growing issue among older adults. Reminiscence therapy can help reduce stress and anxiety for both the those living with dementia and their caregivers, as well as reduce strain on the healthcare system by fostering independence and improving quality of life. Our device utilizes the principles of reminiscence therapy to enhance its effect and boost recollection beyond standard practices. We were able to develop an effective paper prototype that replicates the actions and form that the final product will take. We built a strong foundation that we could use to showcase the possibilities of the reminiscence therapy device and the value it could bring.**

I. Introduction

As people grow older, the risk of dementia increases, and as a large generation ages the amount of people with dementia will greatly increase. A process called reminiscence therapy can help reduce the stress and anxiety that accompanies those who develop dementia. Thus improving quality of life by allowing people with dementia to recall older and fond memories[1]. If ignored, we could see a large influx of seniors with dementia who are struggling and need assistance. Reminiscence therapy involves multiple methods, this can include a wide variety of techniques. This includes activities such as having the person share old memories and stories, looking at old photographs,watching home videos, listening to familiar music, or even tasting nostalgic foods. Some might even handle and use familiar objects and tools to help jog memory[2]. This serves as the basis for our device. Our device allows people with dementia to perform some familiar motions on a physical bench, then receive visual feedback by seeing objects with a similar shape perform familiar actions on screen. Our current prototype showcases a cooking scenario, where users can see a whisk mixing batter, and putting a tray in the oven. Seeing their actions be reflected on screen with familiar props in a familiar scenario, along with the tactile feedback and feeling the motions, helps bring them back to memories of performing these actions. Various digital technologies have begun being used in recent years such as video games, virtual reality, and other computer programs that allow for possibilities not available in the real world. However it can be difficult for seniors to utilize the powers and possibilities these technologies offer[3]. Our device would allow the benefits of digital technology, while allowing seniors to interact with a tactile and easily recognizable control scheme.Pushing and pulling and Rotating.

II. Literature Review

Our main competitors for our device are the Microsoft Accessibility Controller and the Valve Index controllers. However these are both in the context of reminiscence therapy. Although both are designed for games, both can be used in the context of digital reminiscence therapy. The Microsoft Accessibility Controller has the ability to accept a wide variety of inputs that can be used in a digital reminiscence therapy environment. The Valve Index controllers can be used only in a VR specific digital reminiscence therapy environment. Both of these devices are rather complex to set up and use, especially for seniors or their caretakers, who may be unfamiliar with the devices. Our device is designed with reminiscence therapy as a priority. Which means our device is designed with simplicity and ease of use at the forefront. We also found a scientific paper that states that reminiscence therapy has a wider reach beyond dementia. People who suffer from some sort of brain trauma or a stroke, can greatly benefit from reminiscence therapy [4]. These people might also struggle more with fine motor movements. This is where the simplicity and familiarity in design benefits our device when compared to the competition.

III. Methods

We had a design process for each of our components and device as a whole that we would use. An iteration would start with a simple sketch, this is too help us brainstorm and get a good idea of what the design should look like. We would then move to blender for a rough 3D prototype. Since we are very familiar with blender it allows us to create an accurate 3D model that we can reference while we design in Fusion 360. This is extremely helpful to us since we are new to CAD. So having a pre-existing model to reference helps us tremendously. It also helps us get a rough idea of how everything will be sized in relation to each other. While using blender we then animate any parts that might need to move. This is so that we can get an idea of how each component might interact with one another, and stomp out any potential physical conflicts that might arise. If there is we go back to drawing board, if not we proceed onto the next step. Now that we know how our models should be sized relative to each other, and we know that the parts can move as intended, we start recreating the models in Fusion 360 while taking into consideration about what size each component should be back

from the sketch phase. The next step is too create a physical paper prototype of the device or component to get a feel for the size and function and prepare us for the final step. Our final step was to gather feedback from others about the feel and comfort of the device. Once we have gained our feedback we incorporate that feedback for our next cycle of iteration (See Appendix A).

IV. Results

Our original design, was focused around functionality. It showcased our ideas about how the device will look and how it will work. After that was our first physical paper prototype. It gave us a real idea about its physical size and it allowed for us to showcase the device and gather feedback and perform QFD and SUS feedback.Then came our second paper prototype. We added our second input method the Slider Potentiometer. Now all planned input methods were implemented. We also upgraded the quality of the materials for the platforms. In addition we added 3D printed materials, for the push action and a holder to keep the Arduino in place. We also added a new LED feature, this indicates which current mode the device is on (Push or Stir).Finally we have our future iteration and represents what our next paper prototype would aim for. It includes refinements across each aspect of the device. Including an updated Push Block incorporating better design, a new more comfortable model for the Stir Device and Foam to help support and smooth the Stir Device (See Appendix B for Timeline).For our System Usability Scale (SUS) results we got an overall SUS score of 90 out of 100 with a total of 4 people surveyed. However the results may be affected by the fact that the people interviewed do not have dementia. Since the device is designed for people with dementia, results may differ for people who actually have dementia. We got perfect scores on questions 2 and 3. This told us that we succeeded making our design is very simple and easy to use. However some users thought that the way the systems was integrated could use some improvement, and everyone thought that there was some amount of inconsistency in the design and implementation. However each user found that they immediately could understand how the device worked and did not require assistance. Although because of the previously mentioned bias, we are aware that users who do have dementia this answer might differ greatly. Some also found the device slightly cumbersome to use (See Appendix C for SUS results).

V. Takeaways

Over the course of this project we have learned a lot about the design process. One of our takeaways is that you can't just think about the device itself, although it is the most important part, it is also important to think about the assembly process. Its one thing to design how you want your device to feel and function, thought also has to be put into how you plan to put the device together and how the structure of the device will work. We also learned that each prototype needs to be planned as well. Our initial instinct was to go straight for the final design, and that each prototype would help us build upon itself. However we learned that the best call is to actually focus on each prototype itself, then once that's done, gather feedback and focus on the next one. Focusing on the final design can make your thinking rigid and narrow minded. Finally we learned that we are on the right track. Our main goal with this device was to create a device for people with dementia to help with reminiscence therapy, and by extension help bolster their independence. Through our research and utilizing design thinking and QFD, our SUS assessment indicated we were able to create a device that can possibly achieve this goal.

References

[1] Saragih, Ita Daryanti, et al. "Effects of Reminiscence Therapy in People with Dementia: A Systematic Review and Meta-Analysis." Journal of Psychiatric and Mental Health Nursing, 2022, https://doi.org/10.1111/jpm.12830.

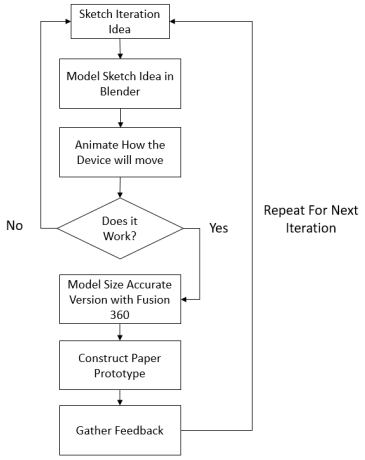
[2] "4 Ways Reminiscence Therapy for Dementia Brings Joy to Seniors." DailyCaring, https://dailycaring.com/4-ways-reminiscence-therapy-for-dementia-brings-joy-to-seniors/. Accessed 23 Sept. 2022.

[3] Akhter, Rabia. A Pilot Study to Explore Healthcare Professionals' Perception of Using a Web-Based Reminiscence Therapy to Support Dementia Care During the COVID-19 Pandemic

[4] World Health Organization. Dementia. https://www.who.int/news-room/fact-sheets/detail/dementia. Accessed 23 Sept. 2022. and Beyond. 2022.

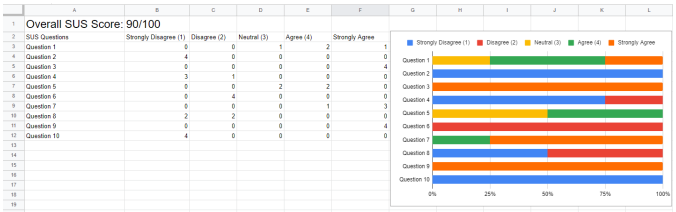
[5] Cheng, Chunmei, et al. "Reminiscence Therapy-Based Care Program Relieves Post-Stroke Cognitive Impairment, Anxiety, and Depression in Acute Ischemic Stroke Patients: A Randomized, Controlled Study." Irish Journal of Medical Science, vol. 190, no. 1, Feb. 2021, pp. 345–55. PubMed, https://doi.org/10.1007/s11845-020-02273-9.

Appendix A
Process Flowchart



APPENDIX B
PROJECT TIMELINE

APPENDIX C
SYSTEM USABILITY SCALE RESULTS



Overall SUS Score: 90/100

SUS Questions	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree
Question 1	0	0	1	2	1
Question 2	4	0	0	0	0
Question 3	0	0	0	0	4
Question 4	3	1	0	0	0
Question 5	0	0	2	2	0
Question 6	0	4	0	0	0
Question 7	0	0	0	1	3
Question 8	2	2	0	0	0
Question 9	0	0	0	0	4
Question 10	4	0	0	0	0